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Understanding core IS capabilities throughout the IS/IT service co-production lifecycle

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ABSTRACT

During service co-production, the firm and the customer jointly participate in design and delivery of the service by leveraging the customer's knowledge and preferences to individually tailor the service for the customer. Here, the main challenge is how a firm's project team may accomplish modifications to meet the customers' needs within the required timeframe. Thus, this research paper explores the role of project team's core capabilities during the IS/IT service co-production lifecycle stages across three case studies. The paper contributes to theory by presenting a matrix model which maps the core capabilities against IS/IT service co-production lifecycle stages. The study also contributes to practice, specifically where firms are looking to enhance their in-house core capabilities in order to improve their IS/IT service co-production involvement with their customers.

KEYWORDS

Service co-production; core IS capability; IS/IT services; service lifecycle

1. Introduction

The role of customer as a 'co-producer' in the production of goods or services has been a topic of debate across different disciplines (c.f. Alter, 2011; Gronroos, 2011; Wikström, 1996). The term 'co-producer' suggests that the customer does some of the work that was traditionally done by the producer. The firm and the customer jointly decide on the production activities, that the customer will participate in while the configuration or design of the product or service, will be a joint responsibility (Jaworski & Kohli, 2006). Therefore, the co-production of a service is an explicit result of leveraging customer knowledge and preferences in order to deliver a service that satisfies their unique requirements and preferences (Etgar, 2008; Ordanini & Pasini, 2008).

In particular, co-production with the customer facilitates service modifications and these modifications are significantly shaped by the firm's potential capabilities (Greer & Lei, 2012). But the main challenge in service co-production activities is how a firm's project team may accomplish service modifications quickly enough to meet the customers' requirements within a definite timeframe. In this way the firm's effectiveness should be considered as a prerequisite parameter for any co-production activities. This study, therefore, explores how

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the firm's core IS capabilities play its role during the IS/IT service co-production lifecycle stages across three pointed case studies.

2. Co-production of IS/IT services and the role of core IS capabilities

Service-related topics have received increased attention from IS scholars across various areas such as service-oriented architectures, including IT service management frameworks like ITIL (Information Technology Infrastructure Library) (Rai & Sambamurthy, 2006) and service co-production and innovation (Alter, 2010, 2014). Despite on-going debates about the coherence of the IS field and the service-related domain, for example Benbasat and Zmud (Benbasat & Zmud, 2003), there is great attention being placed on service engagement within the IS field (Alter, 2011). Lusch and Vargo (Lusch & Vargo, 2006) describe a nested role between service co-creation (value-in-use) and co-production as shared inventiveness, co-design or shared production. It is widely held that the co-creation effort takes place in the usage or consumption stage (Etgar, 2008), while co-production takes place within the production process that precedes the usage stage (Bettencourt, Ostrom, Brown, & Roundtree, 2002).

Through iterative co-production activities between the project team – within an organisation and customer, the project team transforms the customer's information into actionable ideas and this iterative collaboration helps the organisation to see new opportunities and increase the speed of service modifications, for individual customers. These service modifications are significantly shaped by the firm's potential capabilities to adapt to the individual needs of its customers (Bitner, 1990). Thus, such co-production with the customer facilitates service modifications throughout service lifecycle stages – namely: planning, provisioning, operation and enhancement. The main goal in (i) planning stage is to identify the resources which are necessary to plan the provision of a service and also to develop an operational concept for the service which will be pursued through the prospective stages (Rodosek, 2003). (ii) Provisioning stage refers to the configuration of the resources in the service provision which contains design, configure and testing the service (Garschhammer et al., 2001). While (iii) operation stage includes all tasks needed to keep the service operational such as device-oriented configuration or management tools to monitor and control resources that are involved in service provision and its delivery. (iv) Enhancement stage that is referred to process improvement or service elimination that may evolve to various service releases and technological improvements (Fischbach, Puschmann, & Alt, 2013). Figure 1 outlines the co-production service lifecycle stages.

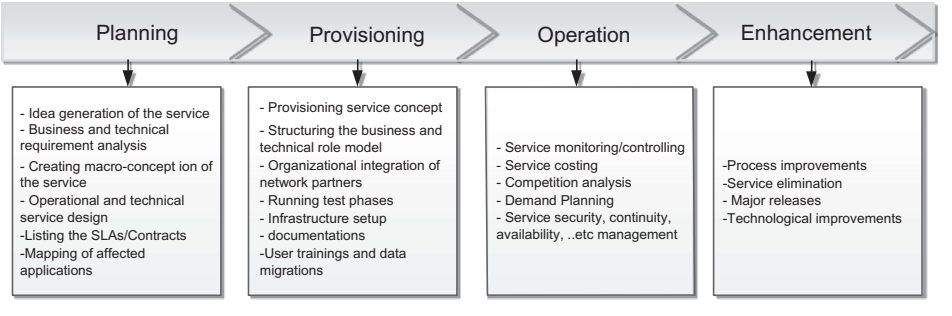

Figure 1. Co-production IS/IT service lifecycle stages.

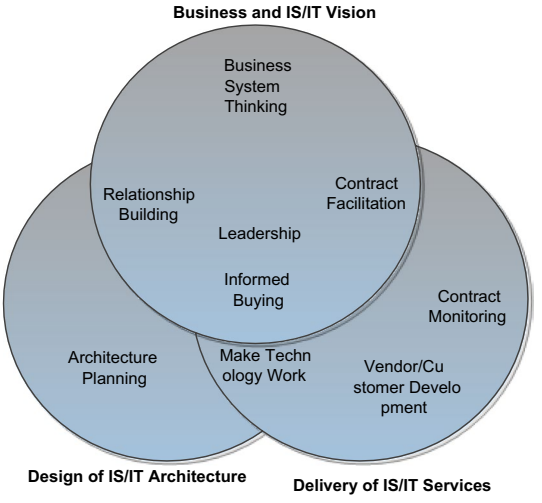

Figure 2. The core IS capabilities' main layers, adopted from (cf. D. F. Feeny & Willcocks, 1998).

With respect to the firm's potential capabilities that may enhance the IS/IT services modifications in particular, Willcocks and Feeny (D. F. Feeny, 1998) propose a core IS capability framework of nine core capabilities. They describe three internal intersecting areas including nine capabilities within the firm's boundary that is relevant to IS/IT services – namely; the 'Business and IS/IT Vision', 'Design of IS/IT Architecture', and 'Delivery of IS/IT services'. The 'Business and IS/IT Vision' addresses a two-way strategic alignment between business and technology while the 'Design of IS/IT Architecture' main focus is on the technical platform solutions on which the IS/IT service is mounted (D. F. Feeny & Willcocks, 1998). But 'Delivery of IS/IT service' layer's main responsibility relates to how an IS/IT service is being delivered (e.g. in low cost and high quality) to customer. Willcocks and Feeney also go further to identify which of these IS capabilities are important within each of the three intersecting areas (i.e. business, technical and IS/IT service delivery) – See Figure 2.

Table 1. The nine IS Core capabilities, adopted from (cf. D. F. Feeny & Willcocks, 1998, Feeney, 1998; D. Feeny, Lacity, & Willcocks, 2005).

Capability	Definition
Leadership (IS/IT Governance) [LE]	Integrates the IT efforts with business purposes
Business Systems Thinking [BST]	Points to planners or business systems thinkers who are important contributors to business problem solving, process re-engineering, strategic development or delivering e-business
Relationship Building [RB]	Improves dialogue and establishes better understanding, trust and cooperation amongst different layers
Architecture Planning [AP]	Refers to a firm's ability to alter the technical blueprint in response to present and future business needs
Making Technology Work [MTW]	Refers to rapidly reacting, solving problems and trouble-shooting
Informed Buying [IB]	Analyses of the market for IT related services
Contract Facilitation[CF]	Relates to ensuring the success of existing contracts for IT/IS services on behalf of the firm
Contract Monitoring [CM]	Current service contract commitments are tracked and which also facilitates the development of performance standards for the particular services market
Vendor/ Customer Development [V/C Dev]	Creates 'win-win' situations between firms and their suppliers/customers

Table 1 describes the nine internal core IS capabilities' definition that are important for a firm to produce an IS/IT service.

These capabilities offer *'a distinctive set of human-based skills, orientations, attitudes, motivations and behaviours when applied, can transform resources into specific business activities'*(Willcocks & Griffiths, 2010, p. 179) and help a firm to address the challenges of aligning business and IS vision, design of the IT architecture, and delivery of IS/IT services (Willcocks, Cullen, & Craig, 2011). The objective of this study, therefore, is to explore the role of the firm's core capabilities in IS/IT service co- production during the IS/IT service lifecycle.

3. The research approach

A case study research strategy is appropriate when the purpose of the research is exploratory(Marshall & Rossman, 1989). Data collection was conducted by choosing three organisations who engage in IS/IT service co-production. The unit of analysis was the co-produced IS/IT service project(s) within each company. Informants in these firms were selected according to theoretical sampling which focuses efforts on theoretically useful cases (i.e. those that replicate or extend theory by filling conceptual categories (Eisenhardt, 1989). Data gathering was conducted through: (i) a structured online questionnaire; (ii) semi-structured individual face-to-face interviews to qualify questionnaire responses; and (iii) analysis of documents and resources related to the co- produced projects that were made available to the researcher. The data analysis involved coding of all data using NVivo version 10. An overview of the three case studies is outlined in Table 2.

Table 2. Overall of the three cases selected for the study.

Characteristic	Spike	QuestLoop	Butane
Managed by firm's Name/ Sector	*University College Cork (UCC) – Academic System Administration Office / public*	*Texuna-Technologies (TT) / private*	*Sameh-Ara Company/ Private*
Co-produced Project description	*A Software as a Service (SaaS) that enables the customer to have a transparency of the modules which are chosen by visiting students (e.g. end-user) and highlights the ones which may require the academic leads' approval*	*A multi-platform service which enables customer (e.g. employers, lecturers or teachers) to build their survey forms and share it with the audiences (e.g. students or staff) in real*	*A series of SAP modules/ services such as transparency HR, BI, FI/CO which have are chosen by been co-produced with end-user) and Butane's organisation (customer) in Gas Industry time*
Modelling approach/ Methodology	*RUP and Design Thinking approach*	*Lean Start-up and Design Thinking*	*Accelerated SAP (ASAP)*
Project Initiation/Completion	*August 2015- Duration 6 weeks*	*2013/2014*	*2013/2014*
Project Outcome	*Successful*	*Successful*	*Successful*
Project's customer/pilot sites	*UCC – International Education Office*	*Limerick City College & Cork City College UCC - Food Business &Development*	*Butane as a public sector's Company*
Informants' positions/Years of Experience	• *Head of Academic Systems Administration Office/5 years* • *IT Analyst/ 1 year* • *IT System Administrator/ 10 years*	• *Research Director/2* • *Innovation Architect/2* • *Commercial Analyst/1* • *Researcher/1*	• *CEO Program & Project manager/10* • *FI/CO Consultant/8* • *SAP-Basis Consultant/8* • *SD/MM/LE SAP Consultant/10* • *SAP ABAP Developer/3* • *SAP BI and PI Consultant/3*

4. Within-case analysis

Three co-production projects namely; Spike, QuestLoop and Butane were studied in three different firms that were located in Iran and Ireland. Two of the projects involved IS/IT service co-production in the private sector (i.e. Butane, QuestLoop) and one project (i.e. Spike) involved IS/IT service co-production in a public sector context. The within-case analysis is presented using a template to produce a structured narrative for each site. Each narrative contains: the organisational background; methodology and modelling approaches during IS/IT service co-production; service specifications and participants' profiles; characteristics of service co-production; the role of core IS capabilities throughout the service lifecycle stages and the top three capabilities during co-production. The sections 4.1 to 4.3 introduce briefly the three co-produced projects and outline an overall schematic capabilities' role during co-production at each site.

4.1. Spike

The Spike project is an IS/IT based service solution (i.e. Software as a Service–SaaS) that has been recently co-produced at the UCC (University College Cork) Academic Systems Administration Office with an internal customer (i.e. International Office - IO). The service has been designed and delivered based on a mixed approach ofusing RUP (Rational Unified Process) and Design Thinking methodologies. In fact, this service has improved the current visiting students' module registration process. The head Academic Systems Administration Office added that, '*we had gone potentially from a complicated way of delivering this service towards a more straight forward style.*' Thus, the Spike has provided transparency and visibility to the student's chosen modules and keeping track of those modules throughout the academic approvals process until the final step which is the student's online registration. With reference to the case narratives and analysis report; out of nine core IS capabilities; seven were highly present throughout the four stages of the IS/IT service co-production lifecycle. Figure 3 presents the importance of each capability during the service lifecycle stages.

As can be seen from Figure 3, the capabilities such as Leadership (LE), Business System Thinking (BST) and Architecture Planning (AP) had the highest level of importance; then the Relationship Building (RB), Make Technology Work (MTW), Informed Buyer (IB) and Vendor/Customer Development (V/C Dev) were at the second level of importance during the co-production of the service. Figure 3 highlights that planning has been an active stage during co-production and the capabilities (e.g. LE, BST, RB, AP and IB) were highly visible at this

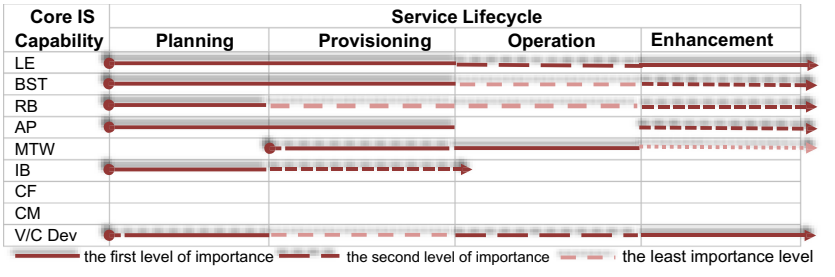

Figure 3. Core IS capabilities for the Spike project.

stage. With referring to the Spike as an inter-organizational co-produced service (no contractual commitment is necessary among internal departments/colleges), so there are no visibility of two capabilities (See Figure 3) such as; Contract Facilitation (CF) and Contract Monitoring (CM).

4.2. QuestLoop

QuestLoop is a Software as a Service (SaaS) multi-platform tool which has been co-produced with the customer by an IS/IT service-based company in Ireland, UK and Russia. The research director of QuestLoop stated that, '*for us the benefits of co- production was the engagement with the customer not at the end, but building with the customer, and it is that we seek out as the innovation sweet spot.*' This service enables customers (e.g. employers, lecturers or teachers) to build their own survey forms and share them with audiences (e.g. students or staff) in real time. It assists education providers and employers to gain rich insights regarding their training and learning activities. The results (the real time graphical and textual feedback on behalf of audiences), reveal what people think about the topics and their impact on the quality of the training investments in organisations or educational bodies. This service was co- produced with the customer based on an integrated framework of Lean Start-up and Design Thinking methodologies. Figure 4 illustrates the role of each core capability during the co-production lifecycle stages of the QuestLoop project.

During QuestLoop co-production, the findings highlighted that the capabilities such as Architecture Planning (AP), Relationship Building (RB) and Vendor/Customer Development (V/C Dev) had the greatest importance across multiple stages of the service lifecycle. On the other hand, Leadership (LE), Informed Buying (IB) and Make Technology Work (MTW) played a key role in only one stage while also being considered of some importance at one other stage of the service lifecycle. With reference to the service design method in this project (e.g. Lean Start-up and Design Thinking), the project team decided to build a good relationship with the customer at pilot sites to test the service, instead of involving in any kind of contractual agreement processes. Thus, Figure 4 outlines no visibility for Contract Monitoring (CM) capability and the team made their decision to go for the generic free of charge usage of this cloud-based service for a temporary time period. The visibility of Contract Facilitation (CF) capability is only related to one of the pilot sites who were interested in QuestLoop as a prospective customer.

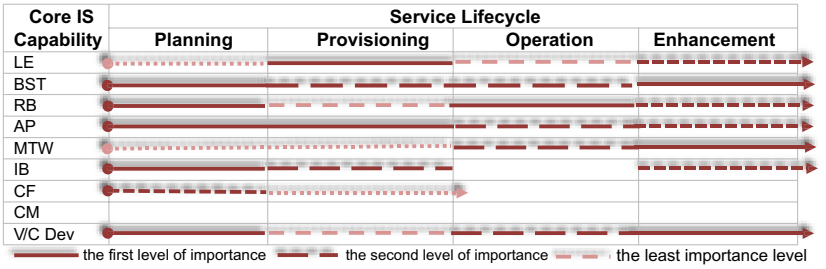

Figure 4. Core IS capabilities for the QuestLoop project.

4.3. Butane

The Butane project is a recent project which has been conducted by an Iranian consultancy company (Sameh-Ara) an organisation which designs, deploys and supports SAP ERP service solutions in various industries (e.g. food, gas and oil). The Butane project involved the co-production of an IS/IT service at the customer's site with 3000 staff and 800 end-users in an Iranian Company in the Gas industry. The majority of Butane's services and processes like Financial and Controlling, Human Resource and Business Intelligence were co-produced based on the customer's unique expectations. The head of Butane project highlighted that, '*the high level of customer commitment to participate in this service project, created a friendly atmosphere between project team and the customer which resulted to beneficial meetings and discussions over challenges*'. The Butane project team co-produced those services based on the Accelerated SAP (ASAP) methodology which encompasses phases such as; project preparation, business blueprint, realization, final preparation and go-live. The findings indicated that all of the core capabilities except Informed Buying (IB) capability were important during co- production. Figure 5 highlights the capabilities' role and their level of importance during the service lifecycle stages.

Figure 5 highlights that throughout the co-production of the Butane service the Leadership capability had a key role especially at the early stages of co-production, followed by Business System Thinking (BST), and Contract Facilitation (CF). There is an exception here in the Butane project in comparison to the other two case studies (e.g. Spike and QuestLoop). This is about the active presence of Contract Monitoring (CM) and its involvement especially at the planning and enhancement stages. Figure 5 also outlines that there is no role for Informed Buyer (IB) capability, as the project team believed that this capability should be considered before any of the service co-production lifecycle stages (e.g. a pre-planning stage).

5. Cross-case analysis – the matrix model between core IS capabilities and IS/IT service co-production lifecycle

The findings illustrate the similarities and differences across three case studies which is resulted in a matrix model. This matrix model allows the core capabilities to be mapped against IS/IT service co-production lifecycle stages (based on their priorities at each stage) across three projects under investigation – See Table 3.

The three cases (Spike, QuestLoop, and Butane) that are highlighted in red colour, outline the highest level of importance of the **core IS capabilities' role** during **co-production service lifecycle stages**. The sections 5.1 to 5.4 discuss more about the red marked cells in

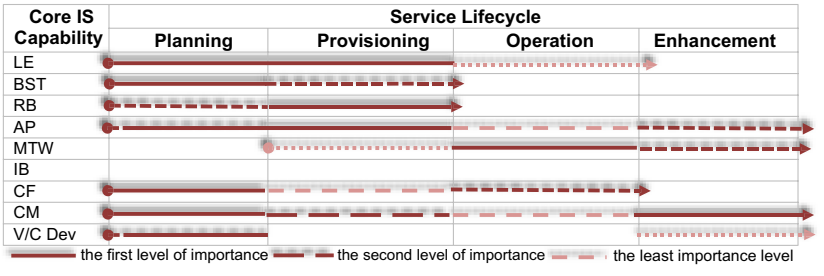

Figure 5. Core IS capabilities for the Butane project.

Table 3. Core IS Capabilities during Co-production Lifecycle stages across three case studies.

Core IS Capability	Service Lifecycle			
	Planning	Provisioning	Operation	Enhancement
Leadership [LE]	**SP,BT**	**SP, QL, BT**	SP,BT	**SP,** QL
Business System Thinking [BST]	**SP, QL, BT**	**SP,** QL, BT	QL	SP, **QL**
Relationship Building [RB]	**SP, QL,** BT	**BT**	**QL**	SP, QL
Architecture Planning [AP]	**SP, QL,** BT	**SP, QL, BT**	QL	SP, QL, BT
Make Technology Work [MTW]		SP	**SP,** QL, **BT**	SP,**QL,** BT
Informed Buying [IB]	**SP, QL**	SP, QL		QL
Contract Facilitation [CF]	QL, **BT**		BT	
Contract Monitoring [CM]	**BT**	BT	BT	**BT**
Vendor/Customer Development [V/C Dev]	SP, **QL,** BT		SP	**SP, QL,** BT

Case legend: SP, Spike; QL, QuestLoop; BT, Butane. ***Bolded font****:* Emphasises the highest level of importance.

Table 3 and also about the first and the second level of capabilities' importance in each case study (e.g. bolded/regular case fonts in red areas) during co- production.

5.1. The importance of fundamental capabilities throughout the planning stage

Across three cases, the strong relationship among project team (i.e. RB capability) especially among (See Figure 2) team members, shaped a group who was able to bottom out the service plan requirements in detail among project team and also via meetings with the customer at early stages of service design. In general, the Relationship Building has had an important role as a bridge between Business System Thinking and Architecture Planning across three cases. This capability played its role at the second level of importance in Butane project in comparison to the other two cases.

The project team had a particular emphasis on Business System Thinking capability because of its 'Holistic' nature to analyse the whole angles of business processes via its technology agnostic lens at the time of planning service. As, this capability assisted project teams' across three cases to manage their resource constraints such as time, scope or budget by identifying mainly if the customer's needs were doable or not before starting the service provision. The active role of BST also guided the team members to pay attention more on enhancing service by adding values and resolving the current processes' bottlenecks. The BST capability was at the second level of importance in QuestLoop project, as the service was dealt with the 'extreme uncertainty' in terms of business requirements especially at early stages and the final solution was not known.

The findings presents that the team members' skillset and good knowledge in IS/IT services and their selected approaches for service design had positively impact on the enhancement of the level of Architecture Planning capability across three cases. This active role of AP capability guided team to plan for a robust, scalable and flexible architecture which could integrate with the others resources like infrastructural resources. This capability was at the second level of importance at the Butane project, as team members were bounded to choose only the SAP ERP's architecture for its service design in comparison to the other two cases.

The project teams' high dense collaboration with the customer (e.g. via regular meetings, service prototype design workshops) assisted team to reach to the potential customers which had a positive impact on enhancing the role of Vendor/Customer Development capability at the planning stage. This capability was highly active during QuestLoop as a SaaS (Software as a Service) in comparison to the other two, because of collaborating with various type of customers in different institutes and colleges as the QuestLoop pilot sites.

5.2. The role of Leadership, Business System Thinking and Architecture Planning at the provisioning stage

Table 3 outlines that the Leadership capability is at the highest and same level of importance across three cases in this stage. When the project team were ready to start to provision the service based on the particular needs which were agreed and crystalized with the customer at the planning stage. The active role of LE capability assisted the role player (e.g. Leader) to steer project team to focus mainly on the core service solutions and guiding them to be aligned only with the available resources such as scope, time, cost, quality and risk during co-production. Because of an active LE capability, the project team could experience concordance and synchronicity at the time of allocating resources at this stage.

The active role of Business System Thinking and Architecture Planning at this stage across three cases, were ensuring the project team about the solidity and stability of service processes and architecture which were agreed on preceding stage. Resolving the current processes' changes and especially the flexibility of service architecture at this stage, assisted members to fulfil some of the customer's new requests at the provisioning stage. Having an architecture plan to deal with the IT infrastructural resources and being as stable as possible during pilot tests (i.e. operation stage) and service updates (i.e. enhancement stage) was the other reasons to enhance the importance level of Business System Thinking and Architecture Planning's role at this stage.

5.3. The Make Technology Work capability as a necessity at the operation stage

According to Table 3, the Make Technology Work capability is at the highest level of importance at the operation stage across three cases. As, the main activities at this stage are; to demonstrate the final version of the service via project team- customer meetings and do some final testing with the customer in terms of any necessary changes and at last the delivery and deployment of the co-produced service. The active MTW capability assisted this role to perform troubleshooting, to resolve minor changes and playing a role as a backlog activity that adds value (e.g. improving service features). This capability was highly important and active especially at Spike and Butane projects, because of the large number of concurrent end-users (e.g. 800 users in Butane and a considerable number of visiting students) at the same time at this stage of service delivery.

5.4. Vendor/Customer Development, Architecture Planning and Make Technology Work capabilities at the enhancement stage

As it can be seen from Table 3, The Vendor/Customer Development is marked at the highest level of importance across three cases, especially in QuestLoop and Spike. Through recent cases, this capability was particularly active, regards to a regular meetings of project team with the customer to enhance the current service features. The active role of V/C Dev capability at this stage also guided team members to reach to the prospective and potential customer(s), through some meetings with a variety group of customers (e.g. online pilot sites in QuestLoop, demonstrating service for the other colleges/departments in Spike) who might be interested in similar IS/IT so-produced services.

The project teams' emphasis on active role of Make Technology Work and Architecture Planning capabilities at this stage. The Make Technology Work capability, assisted team to provide technical resolutions and perform troubleshooting as a backlog activity in order to add value to the delivered service at the time of improving the service features. According to the findings, the architecture plan (i.e. Architecture Planning capability) is also important in terms of future requirements and service updates, in order to cover customer's changes in a way that would have no side effect on the architecture plan which has been agreed in the preceding stages.

6. Conclusion

Figure 6 presents an overall model of the core IS capabilities during the four stages of the service co-production lifecycle.

The overall model demonstrates the following results throughout three case studies:

- The 'Relationship Building' capability has acted as a bridge between 'Business System Thinking' and 'Architecture Planning' capabilities. The specific location of 'Relationship Building' at the intersection of business-techies layers, empowers this capability to assure project team that the business processes and architecture plan are in line with the received customer insights at the time of service design (e.g. planning stage)
- The special locus of 'Vendor/Customer Development' capability at the 'Delivery of IS/IT Services' facilitates the project team-customer collaborations. Thus, the active role of this capability, facilitated the project team-customer discussions around different aspects

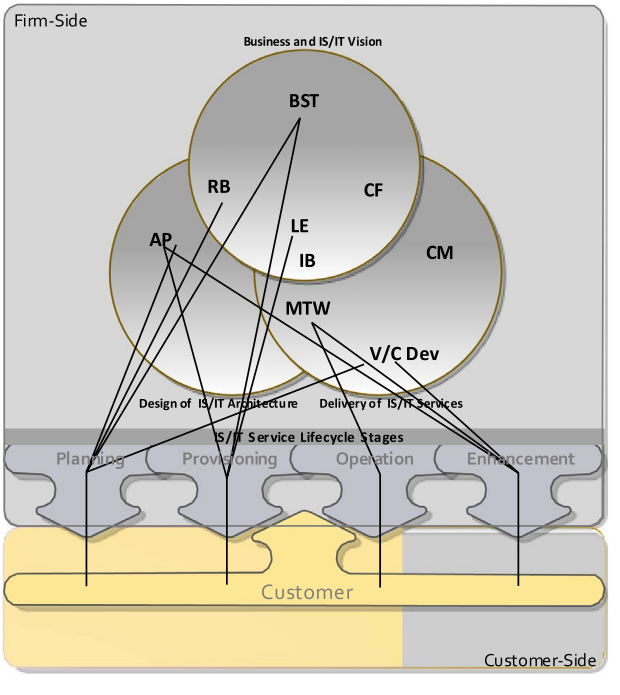

Figure 6. The importance of core IS capabilities across three case studies.

of the service design at the planning, or enhancing the service features, or sharing the report of the recent deployed service with the potential prospective customers to probably receive the similar service offerings at the enhancement stage

- The 'Leadership' capability has been highly active (across three cases) to establish concordance and synchronicity among team members at the time of allocating resources for service provision. Because of the special location of 'Leadership' capability at the intersection of three main layers, this role was ensuring the business, techies and delivery stakeholders, that the customer's requirements that are utilised, are all clear and comprehensible to the team during service co- production
- The 'Make Technology Work' capability is at the high level of importance at the operation stage when the service has been deployed and delivered. The position of MTW capability at the intersection of 'Design of IS/IT Architecture' and 'Delivery of IS/IT Service' identifies its main role that is to take care of the concordance between the service architecture and its other assigned resources (e.g. infrastructural platform)
- The 'Informed Buying' capability has only been important for the Spike and QuestLoop projects at the planning (and not for Butane's project, in terms of the SAP service solutions which was the only choice as the service platform). For Spike and QuestLoop, the capability conducted a clear build-or-buy decision in relation to the off-the-shelf similar services
- The contractual issues was also mainly important only in Butane's project (not for Spike and QuestLoop service projects), therefore the 'Contract Facilitation' and 'Contract Monitoring' capabilities are not highlighted at the overall model

The study demonstrates that the application of the core IS capability framework for the service co-production, would lead these types of collaborative projects to encounter less challenges at the time of mutual service design and delivery. In particular, the attention of all involving project team should be focused around a proper layout of important core capabilities' roles which each individual would play during whole stages of service lifecycle. The core findings also outline the highest level of planning stage involvement with the core capabilities especially in 'Business and IS vision' and 'Design of IT architecture' layers in service co-production projects. This research paper contributes to theory by presenting a matrix model which maps the core capabilities against IS/IT service co-production lifecycle stages. The study also contribute to practice, specifically where firms are looking to enhance their in-house core IS capabilities in order to improve their IS/IT service co-production involvement with their customers.

Disclosure statement

No potential conflict of interest was reported by the authors.

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